Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 18 (3): 501–506
https://doi.org/10.15560/18.3.501

PENSOFT

New records of three lace bug species from Laos (Hemiptera, Heteroptera, Tingidae)

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Abstract

We report from Laos for the first time two genera and three species of lace bugs (Hemiptera, Heteroptera, Tingidae). This brings the number of tingids reported from Laos to 25 genera and 32 species. The two genera are *Eritingis* Drake & Ruhoff, 1962 and *Haedus* Distant, 1904, and the three species are *Eritingis recentis* (Drake & Poor, 1937), *Haedus vicarius* (Drake, 1927), and *Trachypeplus jingae* Dang, Guilbert & Bu, 2013.

Keywords

Eritingis recentis, *Haedus vicarius*, Indochinese Peninsula, Oriental Region, Southeast Asia, *Trachypeplus jingae*

Academic editor: Hélcio Gil-Santana | Received 8 March 2022 | Accepted: 17 April 2022 | Published 13 May 2022

Citation: Souma J, Cho G, Lee S (2022) New records of three lace bug species from Laos (Hemiptera, Heteroptera, Tingidae). Check List 18 (3): 501–506. https://doi.org/10.15560/18.3.501

Introduction

Lace bugs (Hemiptera, Heteroptera, Tingidae) are members of the phytophagous terrestrial true bugs and are generally monophagous or stenophagous, with more than 2,613 species within 318 genera (Schuh and Weirauch 2020). However, so far there have only been three reports of lace bugs from Laos, with 29 known species belonging to 23 genera (Lis 1999; Guilbert 2007; Souma et al. 2022). This prompted us to look for new and unrecorded species of lace bugs in Laos.

Among the collection of lace bugs from Laos, we identified *Eritingis recentis* (Drake & Poor, 1937), *Haedus vicarius* (Drake, 1927), and *Trachypeplus jingae* Dang, Guilbert & Bu, 2013. Here, we report, for the first time, these three lace bug species from Laos. Two genera—*Eritingis* Drake & Ruhoff, 1962 and *Haedus* Distant, 1904—also are newly reported from this country.

Methods

We obtained lace bug specimens from expedition teams of Seoul National University (2012–2015), who had a small collection of the bugs from their trip to Laos. We observed and measured morphological characteristics of these dried specimens using a stereoscopic microscope

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(SZ60; Olympus, Tokyo, Japan) equipped with an ocular grid. The specimens were photographed using a digital microscope (Dino-Lite Premier M; Opto Science, Tokyo, Japan), and image stacks were processed using Adobe Photoshop 2021 v. 22.5.1 (Adobe Inc., California, USA).

All specimens examined in this study were deposited in the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan (ELKU), and Seoul National University, Seoul, Republic of Korea (SNU).

Distribution records of species were mapped using SimpleMappr software (Shorthouse 2010). Geographical coordinates were obtained using Google Maps. We used Adobe Photoshop 2021 v. 22.5.1 to edit the maps.

Results

From the specimen collections of expedition teams, we identified and recorded the presence of two genera (*Eritingis* and *Haedus*) and three species (*E. recentis*, *H. vicarius*, and *Trachypeplus jingae*) of lace bugs in Laos for the first time.

Eritingis recentis (Drake & Poor, 1937)

Figures 1A, 2A

New records. LAOS – **Vientiane Province** • Vientiane District, Plant Protection Center; 17°52′18.7″N, 102°39′48.0″E; 11.II.2014; Geonho Cho leg.; 1 ♀ SNU.

Differential diagnosis. *Eritingis recentis* resembles *E. agyiates* Drake & Ruhoff, 1962 in general appearance, but the former is easily distinguished from the latter by the longer body, 3.0–3.2 mm (Laotian specimen 3.0 mm; 2.7 mm in *E. agyiates*) and the labium reaching the anterior margin of metasternum (Fig. 1A; reaching anterior margin of mesosternum in *E. agyiates*; Souma 2021).

Identification. The recorded specimen (Figs. 1A, 2A) matches well with the photographs of the holotype (National Museum of Natural History, Smithsonian Institution 2022), the Japanese and Thai specimens (Souma 2021), illustrations (Drake and Ruhoff 1962; Drake and Ruhoff 1965), and the original description (Drake and Poor 1937a) of *E. recentis* in terms of their morphological characteristics except for the length of the labium. The Laotian specimen differs from the other known specimens in that the labium reaches the middle part of the mesosternum. In the present study, we considered differences in labial length as intraspecific variation. Therefore, we identified the Laotian specimen as *E. recentis*.

Distribution (Fig. 3). Indonesia, Japan, Laos, Malaysia, Papua New Guinea, Singapore, Thailand, and Vietnam (Drake and Poor 1937a, 1937b; Drake 1947; Drake and Ruhoff 1965; Tomokuni 2008; Souma 2021; present study).

Biology. Adults have been collected in almost all seasons (Drake and Ruhoff 1965; Tomokuni 2008; Souma 2021; present study). The nymph is unknown.

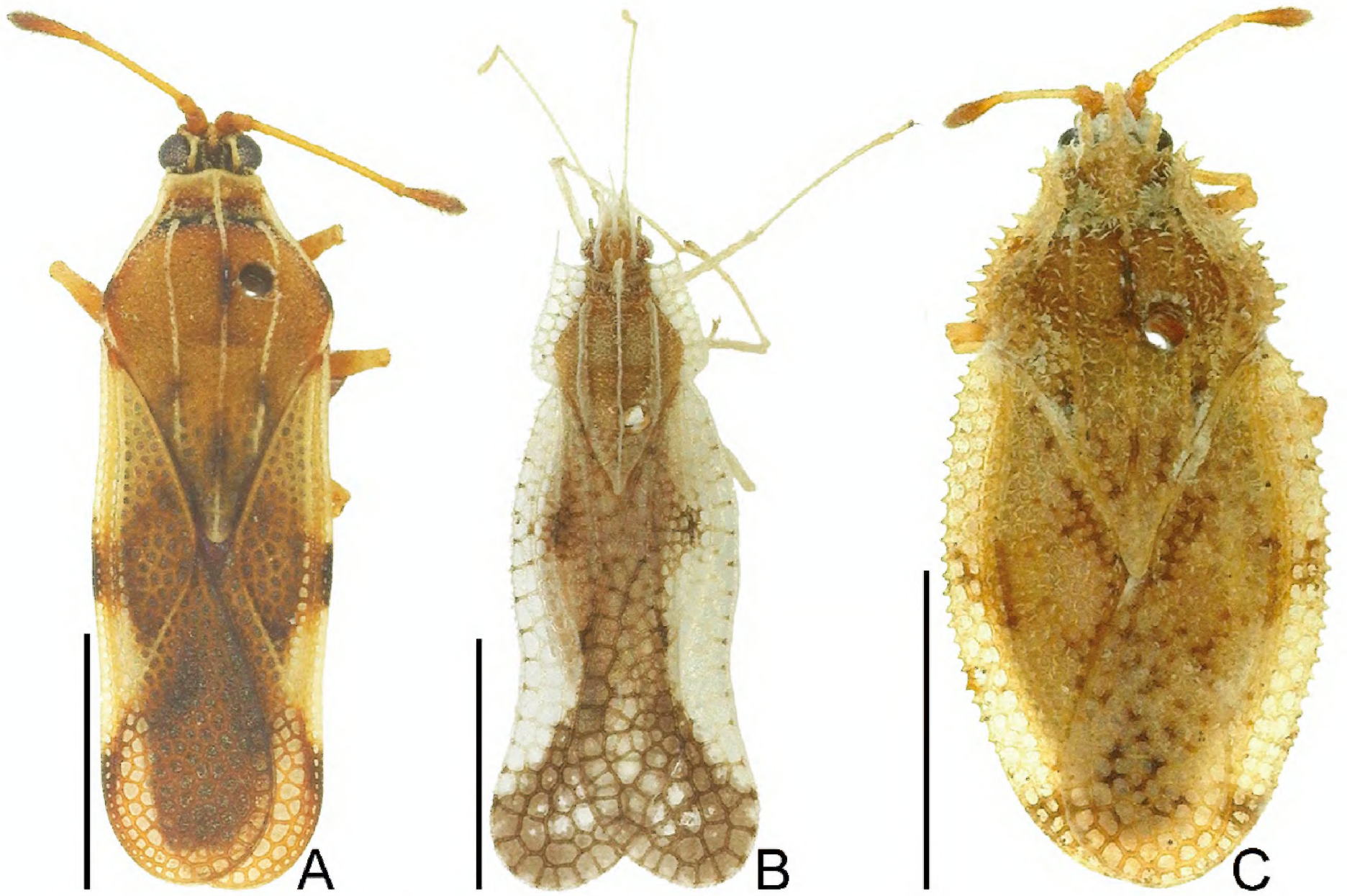

Figure 1. Dried specimens of three lace bug species from Laos, dorsal view. **A.** *Eritingis recentis*. **B.** *Haedus vicarius*. **C.** *Trachypeplus jingae*. Scale bars: 1.0 mm.

Figure 2. Diagnostic characters of two lace bug species from Laos. **A.** Labium and sternal lamina of *Eritingis recentis*, ventral view. **B.** Pronotum of *Haedus vicarius*, lateral view. **C.** Labium and sternal lamina of *Trachypeplus jingae*, ventral view. Scale bars: 0.2 mm.

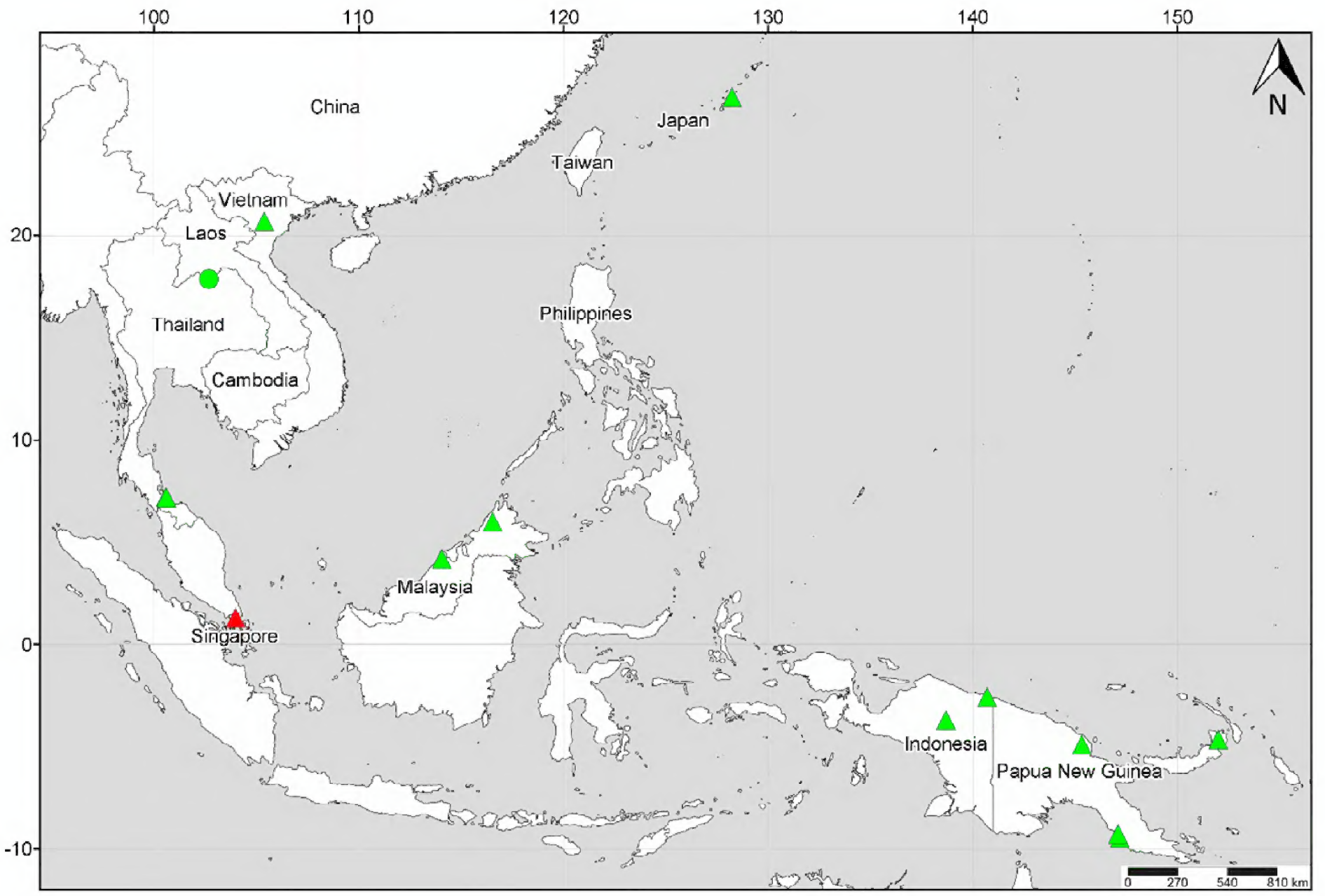

Figure 3. Collection sites of *Eritingis recentis*. Red icon = type locality; green icons = other localities. Circle = new record; triangles = known records.

***Haedus vicarius* (Drake, 1927)**

Figure 1B

New records. LAOS – **Bolikhamsai Province** • Thaphabath District, PKK NBCA, Tad Xai waterfall; 18°27′06.6″N, 103°08′40.4″E; 7.XII.2012; Lee, Duwal & Choi leg.; 1 ♂, 2 ♀, 1 abdomen missing SNU • Thaphabath District, Phou Khao Khouay Biodiversity Conservation Area, Checkpoint 5 km to Tad Xai waterfall; 18°26′26.7″N, 103°09′12.2″E; 27.II.2013; Lee, Duwal & Kim leg.; 1 ♀ ELKU.

Differential diagnosis. *Haedus vicarius* resembles *H. javancus* Drake, 1953 in general appearance, but the former is easily distinguished from the latter by its paler coloration (darker in *H. javancus*) and the shorter body less than 3.0 mm (Laotian specimens: 2.6–2.9 mm) (Fig. 1B; 3.1 mm in *H. javancus*; Drake 1953).

Identification. The above-recorded specimens (Fig. 1B) match well with the photographs and illustrations of a Chinese specimen (Jing 1981) and the original description (Drake 1927) of *H. vicarius* in terms of morphological characteristics. Therefore, we identify the Laotian specimens as *H. vicarius*.

Distribution (Fig. 4). China, India, Indonesia, Laos, the Philippines, Thailand, and Vietnam (Drake 1927, 1936, 1938; Drake and Poor 1937a, 1937b; Jing 1981; Guilbert 2015; Guilbert and Guidoti 2018; present study).

Biology. Adults have been collected in almost all seasons (Drake and Poor 1937a, 1937b; Drake 1938; Guilbert 2015; Guilbert and Guidoti 2018; present study). The nymph has been collected in November (Guilbert 2015).

***Trachypeplus jingae* Dang, Guilbert & Bu, 2013**
Figures 1C, 2B, C

New records. LAOS – **Khammouane Province** • Thakhek District, Phou Hin Poun NBCA, Buddha cave; 17° 43′01.8″N, 104°47′55.5″E; 25.XII.2013; Duwal & Lee leg.; 1 ♂, 1 ♀ ELKU, 5 ♂, 1 ♀, 2 abdomen missing SNU.

Differential diagnosis. *Trachypeplus jingae* resembles *T. jacobsoni* Horváth, 1926 in general appearance, but the former is easily distinguished from the latter by the nearly straight dorsal margin of the hood (distinctly arched in *T. jacobsoni*) and the nearly straight metasternal lamina (Fig. 2B, C; curved outward in *T. jacobsoni*; Dang et al. 2013).

Identification. The above-recorded specimens (Fig. 1C) match well the photographs and the original description (Dang et al. 2013) of *T. jingae* in terms of their morphological characteristics. Therefore, we identified the Laotian specimens as *T. jingae*.

Distribution (Fig. 5). China and Laos (Dang et al. 2013; present study).

Biology. Adults have been collected in April, May and December (Dang et al. 2013; present study). The nymph is unknown.

Discussion

The distribution pattern of the three species of lace bugs, *Eritingis recentis*, *Haedus vicarius*, and *Trachypeplus jingae*, is sparse and outdated. The northernmost (Japan) and southernmost (Papua New Guinea) occurrences of *E. recentis* are at least 4,500 km apart, and the easternmost (Papua New Guinea) and westernmost (Thailand) localities are at least 5,500 km apart (Fig. 3). For *H. vicarius*, the northernmost (China) and southernmost (Papua New Guinea) known occurrences are at least 4,300 km apart, and the easternmost (Philippines) and westernmost (India) occurrences of this species are at least 6,600 km apart (Fig. 4). *Eritingis recentis* and *H. vicarius* appear to be widely distributed in the Oriental and Oceanian regions. Until now, *T. jingae* has only been

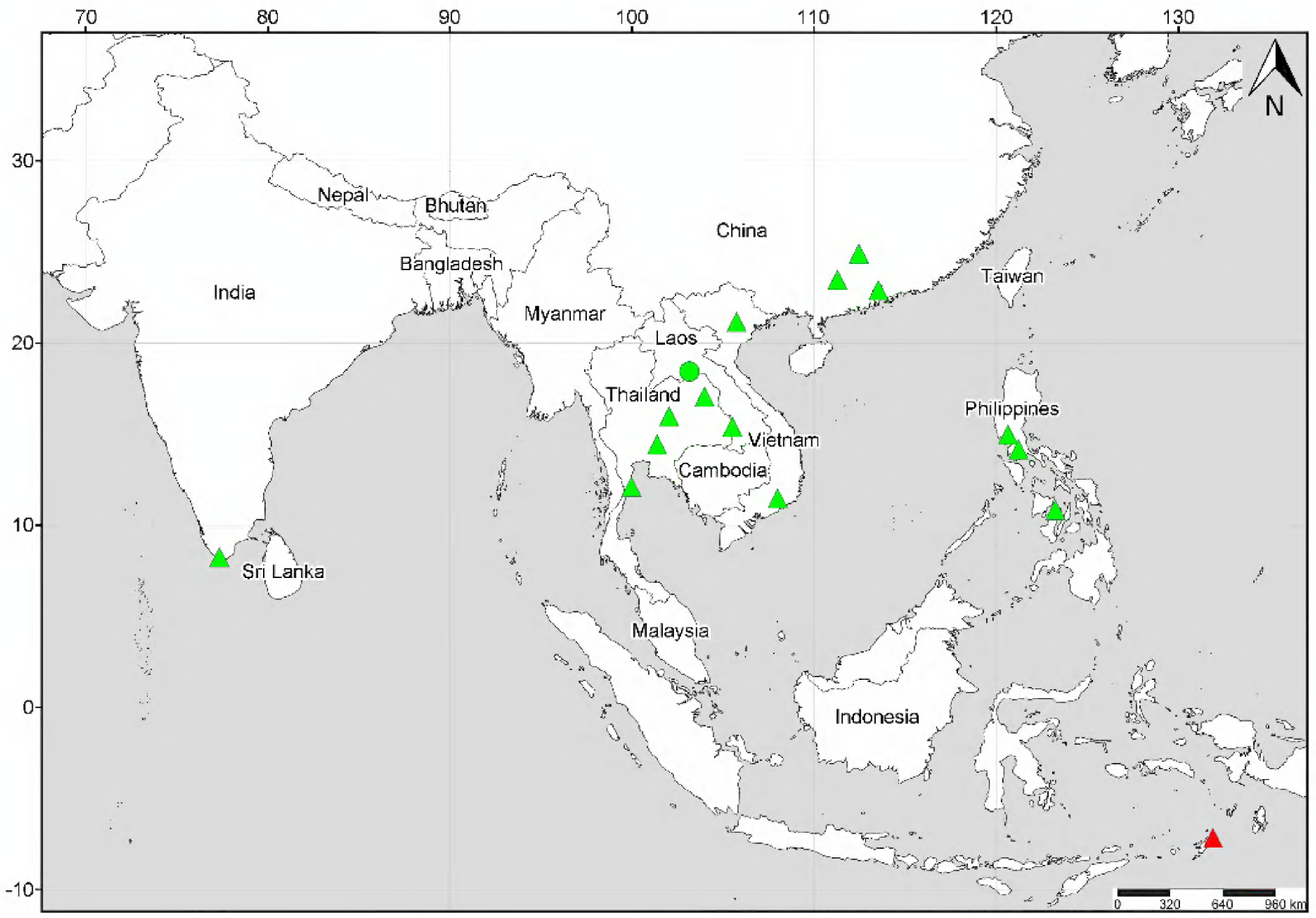

Figure 4. Collection sites of *Haedus vicarius*. Red icon = type locality; green icons = other localities. Circle = new record; triangles = known records.

recorded from two localities in China (Dang et al. 2013). The newly record of *T. jingae* from Laos and the type locality in China are at least 600 km apart. Our report of *T. jingae* from Laos represents the southernmost and easternmost occurrence of this species (Fig. 5). *Trachypeplus jingae* also appears to be widely distributed in the Oriental region, at least on the Indochinese Peninsula. The three lace bug species newly recorded in the present study might be distributed throughout the Indochinese Peninsula. Our findings indicate that the tingids of Laos and Southeast Asia have been poorly studied, and hence there is a need for extensive field surveys in these regions so that more species can be discovered in the future.

Acknowledgements

We express our sincere thanks to Hélcio R. Gil-Santana (Instituto Oswaldo Cruz, Rio de Janeiro, Brazil) and the two anonymous reviewers for critical comment to the manuscript. We thank Ram Keshari Duwal (Agriculture and Agri-Food Canada Environmental Health, Canada) for collecting specimens and assisting in the field. This work was partly supported by a Grant-in-Aid for JSPS Fellows (JP20J20483) from the Japan Society for the Promotion of Science, Tokyo, Japan (JS); the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2020R1I1A1A01074074) (GC); and a grant from the National Institute of Biological Resources (NIBR) funded by the Ministry of Environment (MOE) of the Republic of Korea (NIBR202006203) (SL). We thank Editage (www.editage.jp) for the English language editing.

Author's Contributions

Formal analysis: JS, GC, SL. Investigation: JS, GC, SL. Methodology: JS. Visualization: JS. Validation: JS, GC, SL. Writing – original draft: JS, GC. Writing – review and editing: JS, GC.

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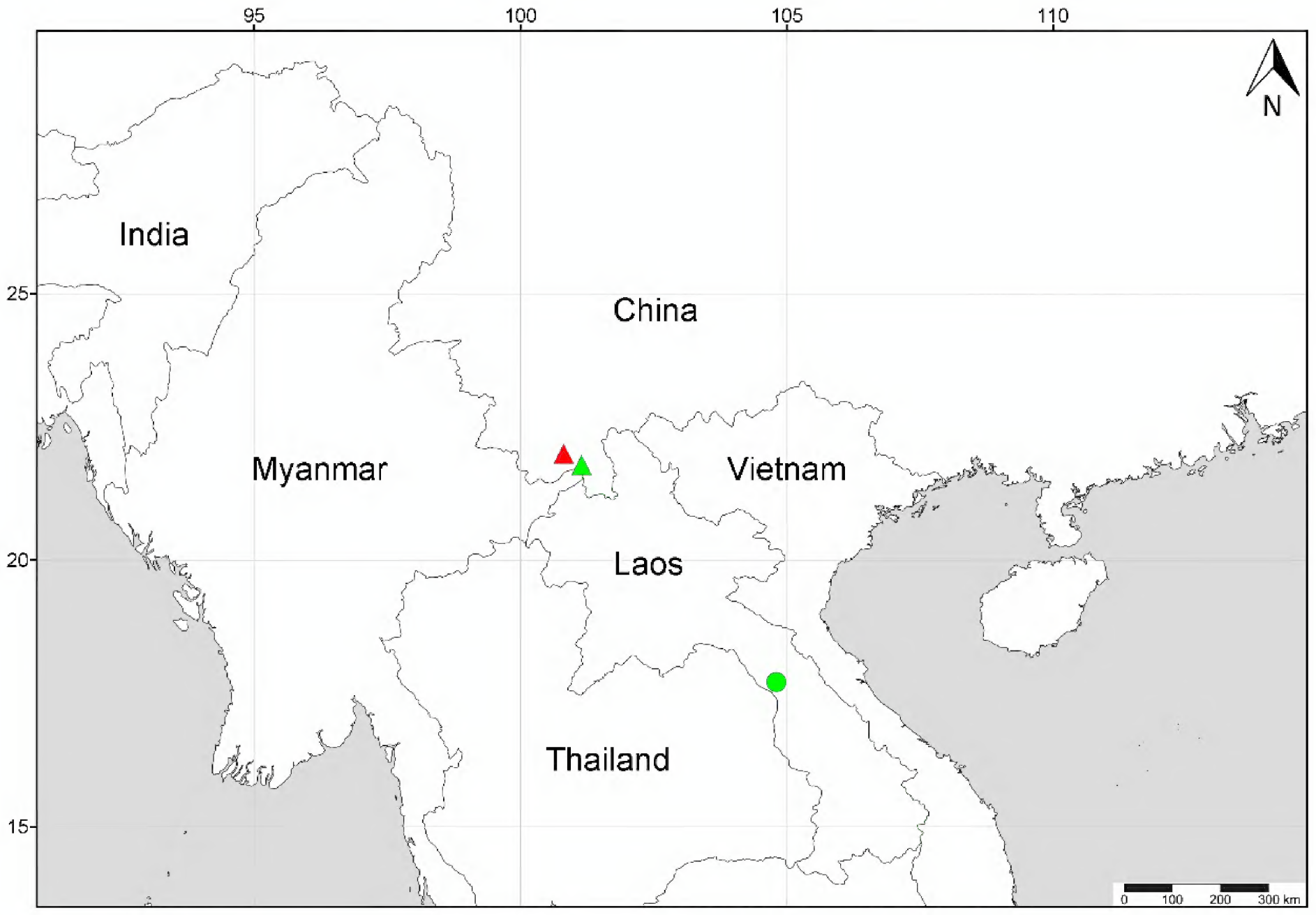

Figure 5. Collection sites of *Trachypeplus jingae*. Red icon = type locality; green icons = other localities. Circle = new record; triangles = known records.

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